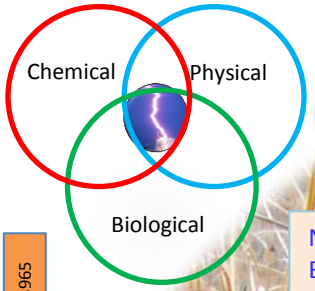
Soil Ecology: Below ground grazers.



A healthy soil is one where there is life!

No Biology? No Benefit.

Soil Food Web.

Soil organisms feed on dead and living organic matter, root exudates (sugars) and each other. 85% of all plant nutrients must be first cycled through microorganisms.

A diversity of plants on pastureland, rangeland and cropland improves soil biota and increases nutrient cycling.

What do they weigh:?

Bacteria	2,000 – 2,500 lbs./ac 2,200 – 2,800 kg/ha
Fungi	1,000 – 15,000 lbs./ac 1,200 – 17,000 kg/ha
Protozoa	20 – 300 lbs./ac 22 – 335 kg/ha
Nematodes	10 – 300 lbs./ac. 13 – 340 kg/ha

Microbes in Humans: 3 lbs./Person

Cow in a field: 1,000 to 1,600 lbs.

The nature and properties of Soils, Brady & Weil , 14th Edition

Bacteria:
- Decomposers of simple or low carbon residue, sugars and root exudates.
- High in Nitrogen and Phosphorus.
- Reproduce rapidly.

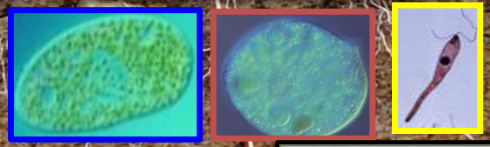
Nematodes:
- Mineralize nutrients by eating fungi and bacteria.
- Transport bacteria and fungi.
- Compacted soil will restrict their mobility.

Actinomycetales:
- Decomposers.
- Controls bacteria in the soil and in humans (antibiotics).
- Convert N_2 gas to ammonia.
- Decompose soil organic matter.
- **Gives earthy smell to soil.**

Earthworms:
- Decomposers / shredders.
- Mineralize nutrients .
- Alter soil structure, water movement.
- **Species**: Epigeic (surface), Endogeic (subsurface) and Anecic (subsoil) .

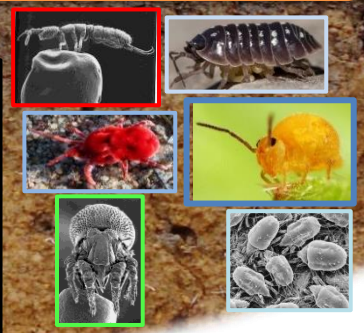
Fungi:
- Mycorrhizal hyphae bring nutrients and water back to the plant in exchange for root exudates / sugars.
- Saprophytic fungi are decomposers.
- High in Nitrogen and Phosphorus.

Protozoa:
- Mineralize nutrients by eating the bacteria and fungi.
- Consume an average of 10,000 bacteria per day, and excrete nitrogen as waste.



Soil Biology Primer.

Arthropods:
- Mineralize nutrients.
- Shredders of organic matter & other.
- Eat microorganisms.



Soil Biota and Plants respond to good aeration, good moisture, 65 - 95 F temperature, high base status soils, and supply of NH_4^+ .
They do their job well at these conditions.

Plants thrive or suffer depending on the life in the soil. Beneficial soil organisms make nutrients available to plants, reduce disease, reduce nutrient losses and help degrade toxic chemicals.

Pasture & Range Health

- Adaptive Grazing Mgt
- Plant diversity
- Living roots throughout the year
- Cover the soil
- Less soil disturbance
- Livestock integration
- Grazing/Rest / Recovery
- Drought planning
- Monitoring
- Alternate season use

Agronomy Tech Note 76: http://www.nrcs.usda.gov/wps/portal/nrcs/detail/nm/technical/?cid=nrcs144p2_068965

Clarence Chavez/Jon Stika 5/2014